

Applicants respectfully disagree, because the reading of *In re Aller* given by the Examiner is incorrect and, additionally and alternatively, because the claimed relationship is not merely a discovery of the optimum or workable ranges.

Contrary to the reading of *In re Aller* given by the Examiner, *In re Aller* does not stand for the proposition that "where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art." Nowhere in the opinion can this language be found (see Exhibit I, which is a copy of *In re Aller* attached for the Examiner's convenience). Accordingly, the rejection of claims 1 and 2 is improper because it is based on an incorrect reading of *In re Aller*. If the same ground of rejection is maintained in the next Official Action, Applicants respectfully request that in order for Applicants to provide a suitable response, the Examiner indicate where support for this language appears in *In re Aller*. 

In re Aller actually stands for the proposition that "wherein the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." This reading of *In re Aller* is also supported by the MPEP (see section 2144.05, II, A, first paragraph). Therefore, two of the conditions required by *In re Aller* for a finding of obviousness are (1) discovery of optimum or workable ranges and (2) the discovery is made by routine experimentation. 

In the claimed invention, as set forth in claims 1 and 2, these two conditions are not satisfied. First, the claimed invention does not involve the discovery of optimum or workable ranges. The process in *In re Aller* specifies two ranges: a concentration of aqueous sulfuric acid between 25 and 70% at temperatures between 40 and 80 degrees. The claimed invention, on the other hand, specifies no ranges. According to the claimed invention, the number of knurled grooves or rolling members can be any number, as long as the claimed relationship between the number of knurled grooves and the number of rolling

members is satisfied. In other words, the number of knurled grooves or rolling members has no lower or upper limit. If the same ground of rejection is maintained in the next Official Action, Applicants respectfully request that in order for Applicants to provide a suitable response, the Examiner indicate what he considers to be the optimum or workable ranges of the claimed invention, and the lower and upper limits of each range.

Second, the Official Action fails to allege, as required by *In re Aller*, that the alleged discovery of optimum or work ranges involves only routine experimentation. In fact, the claimed invention involves a keen insight that the non-repetitive runout can be prevented by the claimed relationship between the number of knurled grooves and the number of rolling members. This insight is not disclosed or suggested by any of the cited references. Therefore, the claimed invention does not involve only "routine experimentation."

In conclusion, at least two of the conditions required by *In re Aller* for a finding of obviousness are not satisfied. Accordingly, claims 1 and 2 are patentable over the cited references.

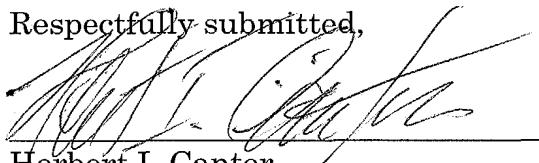
Applicant would like to point out that since the claimed invention does not involve the discovery of optimum or workable ranges, it is patentable over the cited references even if the Examiner's reading of *In re Aller* is applied.

In light of the foregoing remarks, this application is considered to be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #313KA/49958).

July 23, 2002

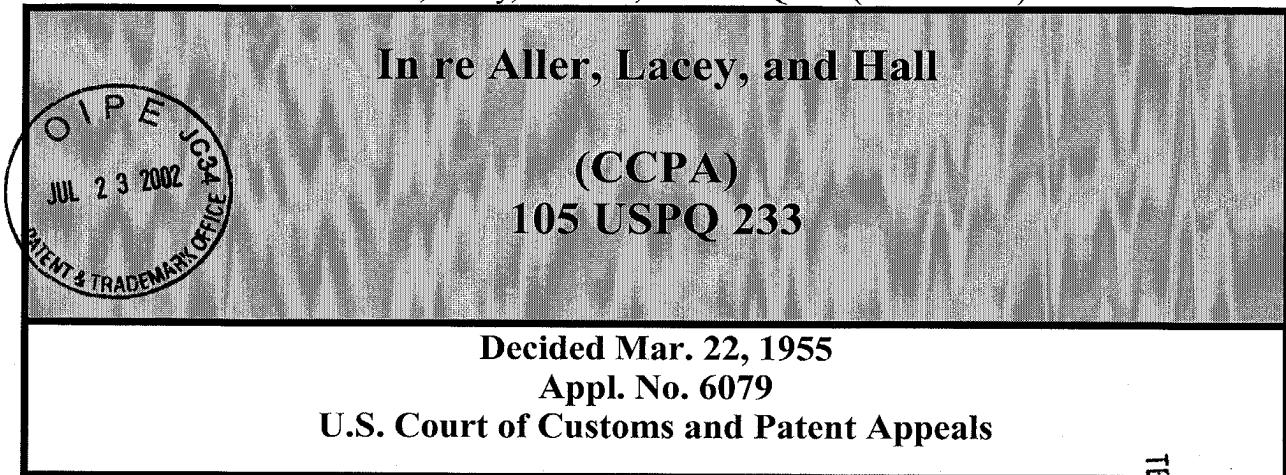
Respectfully submitted,


Herbert I. Cantor
Registration No. 24,392
Song Zhu
Registration No. 44,420

CROWELL & MORING, LLP
Intellectual Property Group
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844
HIC:SZ:tlm (CAM #: 38920.077)

Exhibit I

In re Aller, Lacey, and Hall, 105 USPQ 233 (CCPA 1955)



Headnotes

PATENTS

1. Patentability-Change-In general (§ 51.251)

Patentability-Change - Proportions (§ 51.259)

Normally, change in temperature, concentration, or both, is not patentable modification; however, such changes may impart patentability to process if ranges claimed produce new and unexpected result which is different in kind and not merely in degree from results of prior art; such ranges are termed "critical" ranges, and applicant has burden of proving such criticality; even though applicant's modification results in great improvement and utility over prior art, it may still not be patentable if modification was within capabilities of one skilled in art; more particularly, where general conditions of claim are disclosed in prior art, it is not inventive to discover optimum or workable ranges by routine experimentation.

2. Patentability-Evidence of-Commercial success-Doubtful cases (§ 51.4557)

Commercial success or improved results are important only when question of invention is in doubt; where there is no doubt that improvement resulted from routine efforts of artisan, commercial utility is unimportant.

3. Patentability-Invention-In general (§ 51.501)

To support patent, it must be shown that claimed process was not obvious to one skilled in art, who had prior art article before him.

4. Patentability-Anticipation-In general (§ 51.201)

References are valid for what they convey, explicitly or implicitly, to one skilled in art; that experimentation may not have appeared promising is of no importance; reference may be valid even though it states that its disclosure is not practical.

Particular patents-Organic Peroxides

Aller, Lacey, and Hall, Decomposition of Organic Peroxides, claims 1 to 10, 15, and 16 of application refused.

Case History and Disposition:

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Appeal from Board of Appeals of the Patent Office.

Application for patent of Basil Vivian Aller, Richard Norman Lacey, and Reginald Harold Hall, Serial No. 45,326, filed Aug. 20, 1948; Patent Office Division 31. From decision rejecting claims 1 to 10, 15, and 16, applicants appeal. Affirmed.

Attorneys:

Clinton F. Miller, Wilmington, Del., for appellants.

E. L. Reynolds (J. Schimmel of counsel) for Commissioner of Patents.

Judge:

Before Garrett, Chief Judge, and O'Connell, Johnson, Worley and Cole, Associate Judges.

Opinion Text

Opinion By:

Cole, Judge.

This is an appeal from a decision of the Board of Appeals of the United States Patent Office, affirming the rejection by the Primary Examiner of appellants' application for a patent, Serial No. 45,326, filed August 20, 1948, for "Decomposition of Organic Peroxides." Of the original sixteen claims, claims 11-14 have been withdrawn, and no claims have been allowed, all having been denied as unpatentable over a reference specifically acknowledged in the application as prior art, as hereinafter discussed.

The rejection was made upon an article appearing in the Journal of the German Chemical Society in 1944, by Heinrich Hock and Shon Lang, entitled, "Autoxidation of hydrocarbons, Report no. 9: Concerning peroxides of benzene derivatives." The reference is cited as follows:

Hock et al. Ber. Deut. Chem. Ges., 77B, pages 257 to 262, 1944.

The application is for a process for the production of phenol (carbolic acid), a chemical with wide uses as an antiseptic and preservative, and as an ingredient in the production of synthetic resins, explosives, drugs, photographic developers, and dyes. Ketones (particularly acetone) are produced as by-products of the process.

Basically, the process sought to be patented involves the treatment of isopropyl benzene hydroperoxide (or similar organic peroxides) with sulphuric acid, wherein the hydroperoxide is decomposed into phenol and acetone (or other ketones). So far as pertinent to this appeal, it is not necessary to inquire into the particular chemical reactions occurring in the process, nor is it necessary to discuss the method by which isopropyl benzene hydroperoxide is formed.

The process of appellants is identical with that of the prior art, except that appellants' claims specify lower temperatures and higher sulphuric acid concentrations than are shown in the reference. (Some of the claims also specify the use of solvents, but these are better discussed separately.) The main question involved in this appeal is whether the changes in temperature and in acid concentration amount to invention, or whether such changes would have been obvious to one skilled in the art.

Claim 8 was quoted by the Board of Appeals as illustrative, and reads as follows:

8. Process for decomposing isopropyl benzene hydroperoxide and the production thereby of phenol and acetone which comprises bringing said peroxides into intimate contact with aqueous sulphuric acid of a concentration between 25 and 70% at temperatures between 40° and 80°.

The reference article shows essentially the same process as that recited in the claims, except that the only experiment discussed in the article was conducted at a temperature of 100° C. and with a 10% sulphuric acid solution.¹

The Primary Examiner held that the conditions of the claims resulted simply from experimentally varying the different factors of the process to determine the optimum reaction condition and was within the skill of the art; that there was no evidence to indicate that the reported increase in yields was a difference in kind and not of degree; that no actual commercial success had been shown; that even if commercial success had been shown, it would be insufficient of itself to show invention; and that quickened reaction times were not pertinent to show invention.

The Board of Appeals, in affirming the examiner, stated that experimentation to find the optimum conditions of temperatures and acid concentration was "no more than the application of the expected skill of the chemical engineer * * *." The board stated that the record did not show any significant improvement in the efficiency of the process resulting from a difference in temperature, and that the essential question was whether an increase of concentration of acid which resulted in an increase in yield was a difference of degree only, or whether it was a "difference of such magnitude as to justify the allowance of the claims." The board held that the record failed to support a holding that there was patentable invention. An affidavit submitted by appellants after the examiner's rejection in an attempt to prove that the claimed process was "commercially attractive" while that of the reference was not, was accepted by the board only as further argumentation, and not as evidence.

[1] Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art. In re Dreyfus, 22 C.C.P.A. (Patents) 830, 73 F.2d 931, 24 USPQ 52 ; In re Waite et al., 35 C.C.P.A. (Patents) 1117, 168 F.2d 104, 77 USPQ 586 . Such ranges are termed "critical" ranges, and the applicant has the burden of proving such criticality. In re Swenson et al., 30 C.C.P.A. (Patents) 809, 132 F.2d 1020, 56 USPQ 372 ; In re Scherl, 33 C.C.P.A. (Patents) 1193, 156 F.2d 72, 70 USPQ 204 . However, even though applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art. In re Sola, 22 C.C.P.A. (Patents) 1313, 77 F.2d 627, 25 USPQ 433 ; In re Normann et al., 32 C.C.P.A. (Patents) 1248, 150 F.2d 708, 66 USPQ 308 ; In re Irmscher, 32 C.C.P.A. (Patents) 1259, 150 F.2d 705, 66 USPQ 314 . More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Swain et al., 33 C.C.P.A. (Patents) 1250, 156 F.2d 239, 70 USPQ 412 ; Minnesota Mining and Mfg. Co. v. Coe, 69 App. D.C. 217, 99 F.2d 986, 38 USPQ 213 ; Allen et al. v. Coe, 77 App. D. C. 324, 135 F.2d 11, 57 USPQ 136 .

Bearing in mind the foregoing, we examine the arguments of appellants to determine whether they have demonstrated patentability over the experiment of Hock and Lang.

Appellants specify three improved results from the conditions of the process sought to be patented; increased yields of phenol; increased yields of acetone; and shortened reaction times. These results, it is claimed, combine to make appellants' process commercially attractive while that of the reference would be commercially unattractive.

The yield of phenol reported by the reference article was 75% of theoretical, whereas the examples of appellants' specification show phenol yields of 83.7 to 100%. The reference did not state what acetone yield Hock and Lang obtained, although it did indicate that acetone was produced. Appellants' specification states that in following the conditions of the reference they obtained an acetone yield of about 60%. By their own method, appellants report acetone yields of from 71 to 88%, the yield, however, not being reported for two examples. The Hock and Lang reference experiment was completed in an hour and a half. Appellants' examples show comparable reaction times ranging from a total time of 20 minutes to three hours.

In analyzing these improved results, one is not struck by any difference in *kind* attributable to appellants' process--logically the improvements could flow equally well from changes in *degree* resulting from routine variation in temperature or acid concentration. At the least efficient conditions reported by ap

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pellants, the improvement is but a few percentage points different from the results reported by the reference. At the most efficient conditions, the improvement is still within the range of variation one might expect to result from changes in reaction conditions. There is no temperature range or acid concentration range that can really be termed "critical." As far as is shown, temperatures between 80° and 100° C., and acid concentrations between 10% and 25%, could result in increasingly greater efficiency, somewhat more than Hock and Lang, somewhat less than appellants. Appellants have not shown anything "critical" about their process, unless lower temperatures and higher acidity generally are critical.

Even the affidavit of Sheffield does little more than compare the results reported by the reference and those reported by appellants, and give an opinion as to how much less costly one would be than the other. The affidavit clearly does not show commercial success. It only presents affiant's opinion that when the price of phenol is 19 cents a pound, appellants' production would be economically profitable, while that of the reference would not. His statement is equally compatible with the theory that the improvement is a difference of degree, as it is with the theory that it is a difference of kind.

[2] However, for purposes of discussion, it may be assumed that appellants have shown an improvement over the reference, and that commercial success has been adequately demonstrated. Commercial success or improved results, however, are important only when the question of invention is in doubt. When there is no doubt that improvement resulted from routine efforts of the artisan, then commercial utility is unimportant. To

[3] support a patent, it must be shown that the claimed process was not obvious to one skilled

in the art, who had before him the Hock and Lang article.

Appellants contend that the claimed conditions would not be discovered by one skilled in the art, because shortened reaction times would not be expected with lower temperatures; increased resinification (and hence lower yields) of phenol and acetone would be expected with stronger acids; and greater danger of explosion would be expected at lower temperatures.

In support of the first argument, appellants state that theoretically reaction time is doubled or trebled for each 10°C. drop in temperature, while it is only shortened proportionately with an increase in the concentration of a reactant. Hence, it is argued that a skilled chemist would expect the reaction time to be inordinately lengthened by a decrease in temperature, despite an increase in the concentration of the sulphuric acid. Assuming appellants' propositions to be applicable, it still does not follow that a skilled chemist would not try to shorten the reaction time by lowering the temperature and increasing the acid concentration. Thus, applying appellants' reasoning, at 80°C. and 70% acid concentration (which is within the limits of the claims) it would be expected that the reaction rate would be slowed at least four times by the temperature reduction-but that it would be accelerated *seven* times by the increase in acid concentration.

There is a dispute between counsel as to the validity of appellants' second assertion, that resinification should be expected with higher acid concentrations. The Solicitor for the Patent Office cited authority to show that such resinification occurs only under extreme conditions of pressure and temperature. Appellants in a reply brief give further citation to the same authority to show the conditions were not as drastic as indicated by the solicitor. However, even taking at full value all the statements of appellants, it still appears that the reaction is a slow one, taking as long as twelve hours or more for completion, and that it is affected by temperature. There is no evidence to show that a chemist should necessarily expect that an increase in acid strength would be impracticable. As far as the evidence shows, the increased resinification due to stronger acidity might be negligible in its proportions, or it might be extensive. Experimentation would be indicated to determine the exact effect.

The third argument of appellants in this regard is that a chemist would assume that the reaction would be more likely to be explosive at a lower temperature. It is stated in appellants' brief:

A final consideration and one which is most important is the safety of the process. If the reaction time of the Hock et al. process were to be lengthened as by lowering the temperature, as the hydroperoxide is added to the acid the concentration of hydroperoxide would increase due to the slowness of the decomposition process. *There would then be great danger of the reaction becoming exothermic and causing a violent explosion.* Within the limits of the appealed claims, however, the reaction may be safely carried out. [Italics quoted.]

That a reaction would be more explosive at a lower temperature goes against all common experience, and is apparently based on a gratuitous assumption that

the hydroperoxide will be added to the reaction solution faster than it is being decomposed. Whether or not the general proposition is correct, there is insufficient proof of it in this record for us to reverse the concurring decisions of the tribunals of the Patent Office.

Upon reviewing all of the evidence in the case, it is evident that the contentions of appellants cannot be upheld. Hock and Lang disclosed generally the process of decomposition of isopropyl benzene hydroperoxide by sulphuric acid, with the production of phenol and acetone. They described one experiment and its results, indicating in no way that this was the maximum yield obtainable. Any chemist reading the article could logically assume that higher yields might be obtainable, and by experimentally varying the conditions of temperature and acidity could find the most productive conditions. If it could be held that the skilled chemist would never think to reduce the temperature or increase the acid concentration, then it might be held that invention resides in so doing. However, appellants have not demonstrated such fact. The skilled chemist who chose to experiment with the reference process would undoubtedly try the conditions defined by the claims, although he might be surprised at the extent of improvement obtained. No invention is involved in discovering optimum ranges of a process by routine experimentation. *In re Swain et al.*, *supra*.

[4] Appellants suggest that the decision to experiment with the process in the first place involves invention, apparently on the theory that the process as disclosed by Hock and Lang appeared so impractical that no skilled chemist would have experimented with it. References have always been valid for what they would convey, explicitly or implicitly, to one skilled in the art. That experimentation may not have appeared promising is of no importance. It has been held that a reference may be valid even though it states in so many words that its disclosure is not practical. *In re McKee et al.*, 25 C.C.P.A. (Patents) 1116, 96 F.2d 504, 37 USPQ 613 ; *In re Krukovsky et al.*, 38 C.C.P.A. (Patents) 731, 184 F.2d 333, 87 USPQ 110 .

The Board of Appeals, in concluding its opinion, stated as follows:

* * * any one in possession of the information presented by Hock et al. would naturally experiment to discover optimum conditions of temperature and concentration of acid for commercial exploitation of the process. Such experimentation is no more than the application of the expected skill of the chemical engineer and failure to perform such experiments would, in our opinion, show a want of the expected skill of the engineer. * * *

That we are in complete agreement with the board's reasoning is clear from the foregoing discussion.

Some of the appealed claims, as noted above, specify the use of certain solvents in the process, in addition to the temperature and acid concentration limitations. The Primary Examiner stated that the reference showed the use of solvents, and stated that the choice of a particular solvent was within the skill of the art. The Board of Appeals affirmed this ground of

rejection. Although appellants argue that this feature imparts patentability to the claims, no arguments are advanced sufficient to discredit the examiner's ruling in this respect.

It being apparent that the claimed process is merely different in degree and not in kind from the reference process, and that the criticality of the claimed ranges has not been shown, the decision of the Board of Appeals is affirmed.

Footnotes

Footnote 1. Without subscribing to the accuracy of the translation, we set forth at this point the experiment as described in the reference in the following language:

Acid cleavage: 1.2 g. isopropylbenzol peroxide were heated with 15 ccm. 10% sulfuric acid on the reflux condenser (temperature in the tube 100°, in the condenser 60°). The condenser outlet was connected with a U-tube which contained about 2 ccm. water and was cooled with ice. The reaction mixture was cooled for 1½ hours, 2 g. sodium hydroxide added and then filtered through a wet filter in doing which oily drops (presumably dimethyl - phenyl - carbinol were left behind). The filtrate was shaken with 1.5 g. of benzoyl chloride and the separated phenyl benzoate recrystallized from alcohol. Melting point 68-69°. Yield 1.15 g. (75% of the theoretical). The mixture melting point with phenyl benzoate showed no reduction.

The aqueous solution in the U. tube showed with sodium nitroprussiate on the addition of ammonia and some solid ammonium chloride a permanganate red coloring (acetone).

- End of Case -